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DATE: Monday, January 09, 2006

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	<i>DB=EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=ADJ</i>	
<input type="checkbox"/>	L5 (semiconductor wafer\$) and (bellows accumulator)	1
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<input type="checkbox"/>	L4 (semiconductor wafer\$) and (bellows accumulator)	8
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<input type="checkbox"/>	L2 (semiconductor wafer\$) near10 (bellows accumulator)	1
<input type="checkbox"/>	L1 (semiconductor wafer\$) with (bellows accumulator)	1

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from occurring in a pump. As means for attaining the object, a bellows 7 that is extendingly and contractingly deformable in the axial direction is placed in a pump body 1 with setting the axis B of the bellows vertical so as to be driven to perform extending and contracting deformation, and form a liquid chamber 9 inside the bellows 7. A suction port 18 and a discharge port 19 are formed in an inner bottom face 4a of the pump body 1 facing the liquid chamber 9. Liquid is sucked from the suction port 18 into the liquid chamber 9 by extension of the bellows 7, and the liquid in the liquid chamber 9 is discharged from the discharge port 19 by contraction of the bellows 7. The inner bottom face 4a is formed into a conical shape in which the face is downward inclined as moving toward the discharge port 19. Therefore, also liquid containing a sedimenting material such as slurry can be always smoothly discharged toward the discharge port 19 along the downward inclined face of the inner bottom face 4a without collecting on the inner bottom face 4a of the liquid chamber.

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3. Document ID: US 6945761 B1

L3: Entry 3 of 5

File: USPT

Sep 20, 2005

US-PAT-NO: 6945761

DOCUMENT-IDENTIFIER: US 6945761 B1

TITLE: Fluid apparatus having downwardly inclined lower lamella portion of a bellows

DATE-ISSUED: September 20, 2005

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Nishio; Kiyoshi	Sanda			JP
Fujii; Makoto	Sanda			JP
Katsura; Masayoshi	Sanda			JP
Kawamura; Hitoshi	Sanda			JP

US-CL-CURRENT: 417/472; 92/34

ABSTRACT:

A bellows that is extendingly and contractingly deformable in the axial direction is placed in a pump body and forms a liquid chamber inside the bellows. A suction portion and a discharge portion are formed in an inner bottom face of the pump body facing the liquid chamber. Liquid is sucked from the suction port into the liquid chamber by extension of the bellows, and the liquid in the liquid chamber is discharged from the discharge portion by contraction of the bellows. The extending and contracting portion of the bellows which is configured by forming ridge-like folds and valley-like folds in a vertically alternate and continuous manner is formed into a shape in which the lower one of upper and lower lamella portions of each of the ridge-like folds, or the lower lamella portion is inclined downwardly toward the axis defining the axial direction, not only in an extending state but also in a contracting state. Even in the case where liquid containing a sedimenting material such as slurry is used, therefore, the sedimenting material can be prevented from sedimenting and stagnating in the extending and contracting portion

of the bellows.

6 Claims, 24 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 17

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4. Document ID: US 6612818 B2

L3: Entry 4 of 5

File: USPT

Sep 2, 2003

US-PAT-NO: 6612818

DOCUMENT-IDENTIFIER: US 6612818 B2

TITLE: Bellows type pump or accumulator

DATE-ISSUED: September 2, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Nishio; Kiyoshi	Sanda			JP

US-CL-CURRENT: 417/472; 138/30, 417/395, 417/540, 92/34

ABSTRACT:

It is an object of the invention to, even in the case where liquid containing a sedimenting material such as slurry is used, prevent sedimenting and aggregation from occurring in a pump. As means for attaining the object, a bellows 7 that is extendingly and contractingly deformable in the axial direction is placed in a pump body 1 with setting the axis B of the bellows vertical so as to be driven to perform extending and contracting deformation, and form a liquid chamber 9 inside the bellows 7. A suction port 18 and a discharge port 19 are formed in an inner bottom face 4a of the pump body 1 facing the liquid chamber 9. Liquid is sucked from the suction port 18 into the liquid chamber 9 by extension of the bellows 7, and the liquid in the liquid chamber 9 is discharged from the discharge port 19 by contraction of the bellows 7. The inner bottom face 4a is formed into a conical shape in which the face is downward inclined as moving toward the discharge port 19. Therefore, also liquid containing a sedimenting material such as slurry can be always smoothly discharged toward the discharge port 19 along the downward inclined face of the inner bottom face 4a without collecting on the inner bottom face 4a of the liquid chamber.

3 Claims, 16 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 15

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Sequences](#) | [Attachments](#) | [Claims](#) | [KWMC](#) | [Draw D](#)

5. Document ID: US 6547541 B1

L3: Entry 5 of 5

File: USPT

Apr 15, 2003

US-PAT-NO: 6547541

DOCUMENT-IDENTIFIER: US 6547541 B1

**** See image for Certificate of Correction ****

TITLE: Bellows type pump or accumulator

DATE-ISSUED: April 15, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Nishio; Kiyoshi	Sanda			JP

US-CL-CURRENT: 417/472; 417/395, 417/540, 92/34

ABSTRACT:

It is an object of the invention to, even in the case where liquid containing a sedimenting material such as slurry is used, prevent sedimenting and aggregation from occurring in a pump. As means for attaining the object, a bellows 7 that is extendingly and contractingly deformable in the axial direction is placed in a pump body 1 with setting the axis B of the bellows vertical so as to be driven to perform extending and contracting deformation, and form a liquid chamber 9 inside the bellows 7. A suction port 18 and a discharge port 19 are formed in an inner bottom face 4a of the pump body 1 facing the liquid chamber 9. Liquid is sucked from the suction port 18 into the liquid chamber 9 by extension of the bellows 7, and the liquid in the liquid chamber 9 is discharged from the discharge port 19 by contraction of the bellows 7. The inner bottom face 4a is formed into a conical shape in which the face is downward inclined as moving toward the discharge port 19. Therefore, also liquid containing a sedimenting material such as slurry can be always smoothly discharged toward the discharge port 19 along the downward inclined face of the inner bottom face 4a without collecting on the inner bottom face 4a of the liquid chamber.

6 Claims, 16 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 15

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Exemptions](#) | [Attachments](#) | [Claims](#) | [KOMC](#) | [Drawn D.](#)[Clear](#) | [Generate Collection](#) | [Print](#) | [Fwd Refs](#) | [Bkwd Refs](#) | [Generate OACS](#)

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ACCUMULATOR	55413

ACCUMULATORS	14194
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WAFER	191302
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L4: Entry 7 of 8

File: USPT

Aug 12, 2003

DOCUMENT-IDENTIFIER: US 6604919 B1

TITLE: Fluid apparatus such as a pump or an accumulator

Brief Summary Text (5):

In such a bellows type pump, a diaphragm type pump, and an accumulator, in order to prevent the performance of processing such as washing from being lowered, it is requested to reduce staying of the transported liquid and always supply fresh liquid. In a bellows type pump, an accumulator, or the like, particularly, a suction port of the pump or an inflow port of the accumulator is opened so as to eject sucked liquid or inflowing liquid into a liquid chamber in a direction parallel to the axial direction (direction of reciprocal motion) of a respective bellows. Therefore, the liquid easily stays in an extending and contracting portion of the respective bellows, and contamination tends to occur. In the case where liquid containing a sedimenting material such as slurry of silica or the like is used as a polishing solution for Chemical Mechanical Polishing (CMP) of a semiconductor wafer, a hard disk which is to be incorporated into a computer, and the like, the sedimenting material easily sediments and aggregates in a pump or an accumulator to affect the life of the pump or the accumulator.

Drawing Description Text (21):

FIG. 16A is an operation diagram of the air supply valve and the air discharge valve of the automatic pressure adjusting mechanism in the case where the fluid pressure in the bellows of the accumulator is raised.

Drawing Description Text (22):

FIG. 16B is an operation diagram of a guide shaft and a guide sleeve of the automatic pressure adjusting mechanism in the case where the fluid pressure in the bellows of the accumulator is raised.

Drawing Description Text (23):

FIG. 17A is an operation diagram of the air supply valve and the air discharge valve of the automatic pressure adjusting mechanism in the case where the fluid pressure in the bellows of the accumulator is lowered.

Drawing Description Text (24):

FIG. 17B is an operation diagram of the guide shaft and the guide sleeve of the automatic pressure adjusting mechanism in the case where the fluid pressure in the bellows of the accumulator is lowered.

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